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Biological Evaluation of Spruce Beetle Populations
Curtis Creek Area, Ogden RD
Wasatch-Cache NF

1989

by
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ABSTRACT

The Ogden Field Office of Forest Pest Management conducted a survey of 900 acres on Curtis Ridge of the Ogden Ranger District. The survey objective was to determine existing spruce beetle populations within the unit. Only scattered endemic populations were found during the survey.

INTRODUCTION

The spruce beetle, Dendroctonus rufipennis (Kirby), is a serious pest of Engelmann spruce, Picea engelmannii Parry, in the Rocky Mountains. The spruce beetle generally has a 2-year life cycle (Furniss and Carolin 1977). The adult attacks weakened or wind-thrown trees in the spring. Eggs hatch and larvae develop in the summer. They overwinter as half to nearly full-grown larvae and complete development the following year. New adults emerge in August and migrate to the base of the trees to overwinter.

During endemic years, the spruce beetle primarily attacks wind-thrown or weakened trees and stumps. Outbreaks are often caused by beetle populations building up in wind-thrown trees or logging debris, and spreading to standing trees. They will attack standing trees of all sizes, but prefer the large, overmature trees.

The Curtis Creek area on the Ogden Ranger District of the Wasatch-Cache NF is an area of predominantly spruce covering approximately 900 acres. A buck and scale project was conducted on the north end of this unit in 1983. The felled trees created preferred habitat for spruce beetle populations allowing populations to build and attack standing trees. Timber sales have been conducted in this area to remove the spruce beetle infested trees. The Ogden Ranger District staff wanted to determine if additional infestations were occurring in stands adjacent to the timber sale areas. The results of this survey will be used by Ranger District personnel to determine if additional sale areas are necessary to reduce the risk of a spruce beetle outbreak. The Ogden Field Office of Forest Pest Management was requested to conduct a survey in 1989 by Glen Casamassa, Ogden Ranger District forester.

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EXPERIMENT STATION

METHODS

The area was outlined on USGS quad maps (Curtis Ridge) with points to be surveyed systematically placed on the maps at 10x20 chain intervals. However, many of the plots were on a 5x10 chain spacing in the spruce type (MAP 1). Crews of two people collected data at each point noted on the map.

Four points were considered count plots; at every fifth point volume information was collected. The following is the procedure used for the count plots:

A 20 BAF prism or angle gauge was used to determine if trees fell within the plot area. Every other borderline tree was taken as an 'in' tree. Data was collected on all trees five inches or greater DBH; this included tree species and tree condition (dead or alive). If an Engelmann spruce had been attacked by spruce beetle, tree DBH (to the nearest tenth of an inch), total height in feet, and year of attack, were recorded.

For the volume plots, the following was recorded:

The same procedure followed in the count plots were used to determine the 'in' trees on the plot. All trees five inches or greater within each plot were examined and the following data collected: species, DBH, total height, condition (live, infested, or dead within the last ten years), and the cause of mortality.

On volume plots, the regeneration on a fixed-radius (6.8' for 1/300 acre) plot was measured. If the tree was under 1" DBH, it was recorded as a seedling along with the number of seedlings for each species. If the trees were greater than 6 inches tall and between 1-4.9 inches, tree DBH and species were recorded.

The information from the field evaluation was used to determine if spruce beetle populations were increasing in the Curtis Ridge area. The R-4 cruising program, CRUISEIN, was used to determine gross volume for each tree species.

RESULTS AND DISCUSSION

A total of 280 variable radius plots were surveyed, 55 of these were volume plots. Species abundance in descending order was aspen, Engelmann spruce, and subalpine fir. Gross volumes for each species was calculated and is listed in Appendix 1. (A complete listing of the CRUISEIN program output is available from FPM-Ogden Field Office.) Total tree volume for all species was 12,081,735 board feet. Of that amount, 92.6 percent was live volume. Most of the dead volume was associated with subalpine fir mortality. Only 29 percent of the volume plots had any seedlings or saplings present. The majority of this regeneration is subalpine fir and aspen. See Appendix 2 for more details.

Survey results indicate that relatively few current spruce beetle attacks occurred within the surveyed area. Only one currently infested spruce tree was tallied out of the 1,500 trees examined.

Spruce beetle populations within the surveyed unit are at endemic levels. Although spruce beetle populations are low, silvicultural practices to reduce spruce beetle risk in the surveyed area should be implemented to decrease the areas susceptibility to spruce beetle attack. Spruce stands with the following characteristics are considered high risk: 1) Arrange diameter of live spruce

>16 inches, 2) Basal area of spruce >150 ^{2} feet, 3) Proportion of spruce in canopy >65 percent, and 4) Spruce on sites with site index of 80 to 120.

LITERATURE CITED

Furniss, R.L., and V.M. Carolin. 1977. Western forest insects. USDA Forest Service Misc. Pub. No. 1339. 654 p.

MAP 1

Plot Locations within the Curtis Ridge Area

APPENDIX 1

Volume Summary

Gross volumes in board foot:

Species	Live	% of Total	Dead	% of Total
Douglas-fir	575,074.0 (100%)	4.7	0 (0%)	0
Subalpine fir	2,675,785.0 (83.1%)	22.1	545,665.0 (16.9%)	4.5
Engelmann spruce	6,074,677.0 (95.7%)	50.3	270,610.0 (4.3%)	2.2
Aspen	1,860,207.0 (95.7%)	15.4	79,717.0 (4.1%)	0.7
Totals:	11,185,743.0	92.6	895,992.0	7.4

GRAND TOTAL: 12,081,735.0 board feet

* Numbers in parentheses note the percent of live or dead volume within that species type.

APPENDIX 2

Regeneration Summary

PLOT #	SPECIES	# TREES < 1"	# TREES > 1"
20	DF	1	
31	ASP	4	
36	ES		1
	SAF	6	
44	SAF		2
49	ASP		1
54	SAF		1
	ASP		6
62	ES	1	
67	ES		2
	SAF	3	1
77	ASP	5	3
100	SAF	1	
156	SAF		1
180	DF		1
	SAF	2	
	ASP	5	
196	ASP	3	
214	SAF		1
227	ASP		4
232	SAF	6	7
	ASP		12
258	ASP		2
	SAF		6
274	ASP		1
	ASP		4

DF - Douglas Fir ASP - Aspen SAF - Subalpine Fir ES - Engelmann Spruce

TOTALS:

16 plots had tree species regeneration out of 55 = 29.09 percent of the volume plots have regeneration..

Species	# Trees < 1"	% of total	# Trees > 1"	% of total
DF	1	1.07	1	1.07
SAF	18	19.35	19	20.43
ASP	17	18.28	33	35.48
ES	1	1.07	3	3.22
	37		56	